

From LMS to VLE or from supermarkets to airports: Classifying elearning platforms using metaphors

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This paper presents a rational model developed to make sense of various elearning platforms currently in use in Australian universities. The conceptualisation and organisation of the elearning platforms is underpinned by an educational psychology framework of social construction of meaning, data visualisation and story telling for meaning making. The model explains how various elearning platforms can be integrated to represent a three-dimensional, hierarchical construct that has the potential to aid understandings about the utility of information systems (IS) for learning and teaching. The model shows that LAMS, which has gained increasing popularity in Europe (Laurillard & Masterman, 2010), is usefully depicted as a 'middle ground' system, successfully bridging conventional LMSs and more advanced IS, referred here as (MU)VLEs (Multi-User Virtual Learning Environments). The model has important implications on how university lecturers, classroom teachers and students come to engage with an increasingly complex elearning environment.

Keywords: LMS, LAMS, VLE, metaphors, classification

Introduction

When faced with a new environment
and seemingly new challenges, we adapt to that
environment and solve problems in the same
manner we have for eons.

(Knock, Hantula, Hayne, Saad, Todd & Watson, 2008, p. 136)

Electronic communication is on the increase, from eGovernment and eHealth to eLearning. Although we seem to be using online communication more readily today, we will be using it even more often in the future to the extent that it has been referred to by Rusch (2008), as "the ICT-sation of our lifeworlds" (p.33), leading to a greater participatory culture. Nevertheless, there is still much uncertainty and confusion concerning the various media platforms and options available. Technology mediated solutions are now accepted as useful additions to the education landscape. However, there are persistent voices that claim that learning technologies are not as effective as their proponents make them out to be and they should not be used to displace face-to-face teaching and learning. In-depth knowledge of information systems, their features, similarities and differences is usually not part of a lecturer's or student's theoretical repertoire. However, without some fundamental understandings of elearning platforms, it is unlikely that people working with them (lecturers and students) will see their potential in aiding their professional work (Conole, Brasher, Cross, *et al.* 2008). For learning technologies to become as pervasive as they should, in transforming education and expanding traditional modes of learning and teaching in the promotion of efficacy and quality, education stakeholders must be cognisant of the range of elearning platforms and their utilities. In this paper, we use elearning and online learning interchangeably.

Using data visualisation techniques, the paper introduces a taxonomy of commonly used learning technologies, commencing with a peer comparison of the following learning management systems (LMS): Sakai, WebCT/Blackboard, Moodle and SCORM. All of these LMS are in common use in higher

education. They are contrasted with a learning activity management system (LAMS) developed by Macquarie University in Australia, and a customised (MU)VLE (multi-user virtual learning environment) developed by the Centre of Flexible Learning in Dentistry, King's College London, UK.

The aim of the paper is to provide clarity for lecturers, teachers and students about the various systems in use and their similarity and difference. To this end, it engages with the following questions:

- What types of LMS are currently in use?
- What are the characteristics of the various LMS in circulation at higher education institutions in Australia and abroad?
- Which LMS is perceived as 'most popular'?
- How effective are the various forms of LMS for knowledge generation and academic development of students?

In its examination of current debates about the various forms and functions of elearning platforms, this paper draws on a number of recently completed comprehensive reviews of LMS by Landon, Henderson and Poulin (2006) from the Massachusetts Institute of Technology and Steel (2009). A key finding of the systematic review of the research literature is that the positive effect of elearning on academic performance can be attributed to two interrelated factors: (a) highly developed learning-to-learn skills and (b) intrinsic motivation. Hence, it is not surprising to note this paper also concludes that investing in the education of lecturers, tutors and students about elearning is urgently needed.

The current paper is intended to serve two functions in achieving its aim: the first concerns basic theory generalisation through the synthesis of information technology research and application, more specifically, description of the nature and function of LMSs, LAMS and VLEs, all of which are used currently to various degrees in higher and further education in Australia and elsewhere. The second concerns the need to promote elearning as a future focused education concept.

Why do we perceive there to be an urgent need to clarify and organise the various elearning platforms into a tentative structure, to create a working model? Frank Schirrmacher, an influential German journalist explained in an interview with John Brockman (2009) the analysing and synthesising and organising of information for general consumption as 'translating society into literature'.

What did Shakespeare, and Kafka, and all these great writers — what actually did they do? They translated society into literature. And of course, at that stage, society was something very real, something which you could see. And they translated modernization into literature. Now we have to find people who translate what happens on the level of software. At least for newspapers, we should have sections that review software in a different way, at least the structures of software. (Brockman, 2009)

In this paper, we have taken on the role of translators, joining other virtual learning experts in the endeavour of bridging the technology pedagogy divide. Figure 1 (see below) presents a schematic example of the three-dimensional learning technologies model based on the metaphors introduced here. The metaphors are utilised as a discourse strategy to make learning software more accessible to non-experts and assist them to adjust to a new learning environment, one that incorporates pedagogies that use various learning technologies.

Foregrounding the section on the usage of metaphors, the theoretical construct underpinning our discussion, namely the unified theory of acceptance and use of technology model (UTAUT), is briefly explained. The aim is to link metaphors to easy conceptualisation of our elearning model. This theoretical discussion is followed by a detailed explanation of our three-dimensional construct of online learning and teaching platforms: LMSs, LAMS and VLEs and their metaphorical relationships. LMSs are introduced as supermarkets; whereas LAMS is viewed as a school and VLEs are depicted as airports (see Figure 1).

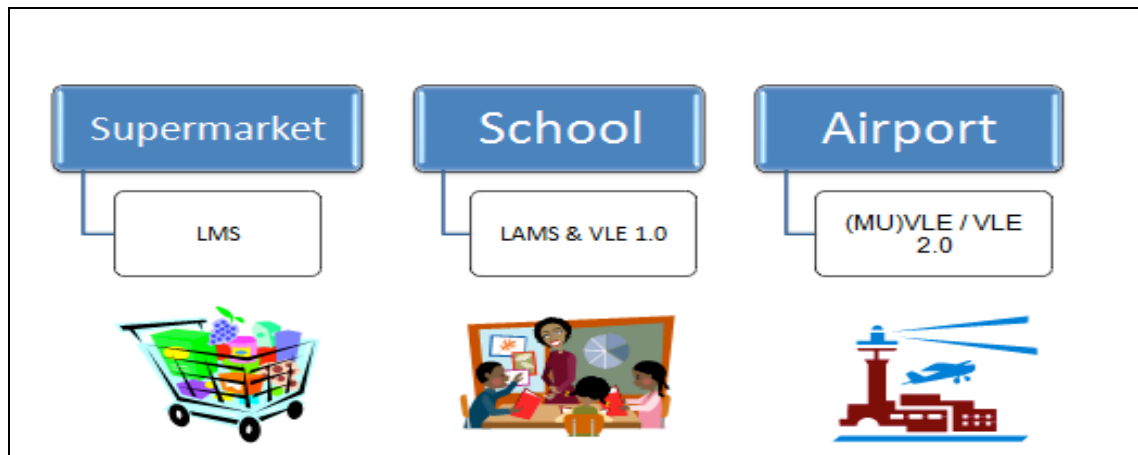


Figure 1: From supermarkets to airports

The term VLE 1.0 is used narrowly here, generally meaning elearning using basic online learning tools. The next generation of VLEs, VLE 2.0 use a universal platform to allow for mash-ups (different technologies to connect) often using open source software (Weller, 2007). A similar enterprise level system, but using a membership model, has been created for online dental training (Schönwetter, Reynolds, Eaton & deVries, 2010). 3D worlds such as OpenWonderland and SecondLife™ can interface with these advanced flexible systems allowing the use of avatars (Suman, Elson & Reynolds, 2010). However, the 3D virtual worlds themselves have been used as learning environments enabling connections to educational tools and learning content. The term ‘a multiuser virtual environment’ (MUVE) applies to such scenarios (Clarke and Dede, 2007).

Theoretical construct

Venkatesh, Morris, Davis and F. Davis (2003) introduced a theory that predicts behavioural intentions of students in relation to technology-enhanced learning and teaching. The model is known as the Unified Theory of Acceptance and Use of Technology (UTAUT) and differentiates between four aspects of behaviour intentions or usage: (a) performance expectancy; (b) effort expectancy; (c) social influence; and (d) facilitating conditions (see table below).

Table 1: The UTAUT aspects of behaviour intentions

<i>Aspects</i>	<i>Description</i>
Performance expectancy	Beliefs about the usefulness of a platform or system for personal gain or learning performance
Effort expectancy	Beliefs about the degree of difficulty or ease of platform or system's usage
Social influence	Beliefs of others about the usefulness of the platform or system for personal gain or learning performance that influences the engagement decision of the learner
Facilitating conditions	Beliefs about the organizational and technical infrastructure that influences the engagement decision of the learner

Adapted from: Venkatesh et al 2003, p. 447-453

The model introduced here, which aims to enable sense-making about the similarity and difference between various elearning platforms currently in use in Australian universities, is based on the above-mentioned information systems theory. It uses symbolisation (metaphors) as a tool for meaning making, depicting the gradual move from pedagogies of consumption (LMS) to pedagogies of participation and production (LMS and (MU)VLE).

The next section explains our use of metaphors before proceeding with an explanation of the choice of metaphors for various elearning systems.

Why use metaphors?

The use of metaphors are a practical strategy when explaining complex ideas or sharing a particular conception. Metaphors can be important catalysts in an effort to connect the newly introduced information with existing knowledge constructs. Using metaphorical images is helpful in the explanatory quest to make the unfamiliar (new concept or idea) accessible by relating it with what is already known and based on easily recognisable conceptions. An example is that of linking the new concept of ‘informavore’ to the commonly understood notion of ‘animal’ (omnivore consuming any food category) and creating an image of modern society where some are consuming all kinds of information, whereas others are more selective, creating a power imbalance (linking to Darwinian notions of survival of the fittest), Frank Schirmacher (in Brockman, 2009). That exemplifies the power and utility of metaphors in making unfamiliar and abstract concepts become familiar and hence useful. The careful structuring of information using metaphors as catalysts, results in the emergence of a new mental model that serves as a bridge between the new and the old.

Frank Schirmacher explains his views of the effect of the internet creating an oversupply of information:

As we know, information is fed by attention, so we have not enough attention, not enough food for all this information. And, as we know — this is the old Darwinian thought, the moment when Darwin started reading Malthus — when you have a conflict between a population explosion and not enough food, then Darwinian selection starts. And Darwinian systems start to change situations. And so what interests me is that we are, because we have the Internet, now entering a phase where Darwinian structures, where Darwinian dynamics, Darwinian selection, apparently attacks ideas themselves: what to remember, what not to remember, which idea is stronger, which idea is weaker. (Brockman, 2009)

In response to Schirmacher’s example used in an interview with Brockman and reproduced in a blog, open for comments, Daniel Kahneman (in Brockman, 2009) offered the following metaphorical counter example:

The interview vividly expresses the sense many of us are getting that when we are bathed in information (it is not really snippets of information, we need the metaphor of living in a liquid that is constantly changing in flavor and feel) we no longer know precisely what we have learned, nor do we know where our thoughts come from, or indeed whether the thoughts are our own or absorbed from the bath. (Brockman, 2009, n.p.)

The use of examples and counterexamples can help us understand new concepts. Hence, metaphors are powerful linguistic tools that highlight certain aspects, effectively aiding the meaning making process (i.e being bathed in information rather than choosing to ingest or eat information). Metaphors are often used to trigger an image schema by exploring widely-recognised images and relating it to new and unfamiliar concepts (Ritchie, 2006).

Educational psychology has long recognised metaphors as a basic learning and teaching tool as teachers narrate scenarios in an attempt to aid the conceptualisation of underlying principles and causal relationships (Chartesis-Black, 2005; Dobozy, 2010; Ritchie, 2006; Wee, 2005). Metaphors allow us to ‘see anew’, meaning we are able to understand particular relationships and inferences. This idea of ‘seeing’ is important as Simon (2007) explains: “we see what we understand” (cited in Proulx, 2010, p. 57).

Whereas some researchers equate LMSs simply with VLEs (Yasar & Adiguzel, 2010), the aim of this paper is to provide a more detailed conceptualisation, namely a three-dimensional classification system, depicted as the ‘shopping centre’ (LMS), the ‘school’ (LAMS) and the ‘airport’ ((MU)VLE 2.0), drawing on metaphors to make explicit our model of a gradual increase in complexity of information systems (IS) (see Figure 1). This depiction of elearning may aid transformation of online learning

behaviours of education stakeholders through a better understanding of currently used learning technologies.

What is an LMS and how is it defined?

	<i>LMS/VLE 1.0 Definitions (the shopping centre)</i>	<i>LAMS/VLE 1.0 Definitions (the school)</i>	<i>(MU)VLE / VLE 2.0 Definitions (the airport)</i>
	Dimension 1 – Foundation stage (come and grab)	Dimension 2 – Developing stage (come and interact)	Dimension 3 – Experiential stage (come and be)
Used by Landon, Henderson and Poulin (2006)	Is mainly used by lecturers to deposit documents and manage online and blended learning, including the tracking of student online behaviours.		
Used by Dobozy & Pospisil (2010)		Is mainly used for online or blended learning, enabling easy communication and collaboration among learners. It is placing the responsibility of learning into the hands of learners. It builds on Web 2.0 principles and uses learning objects, generic and reusable content.	
Used by Weller (2006)			Is mainly used for online and blended learning, enabling total immersion and builds on Web 2.0 principles. (social software, reusable content and components, harnessing collective intelligence etc). It allows for student control and great flexibility and customisation.

Table 2: Definitional constructs of LMS/LAMS/VLE 2,0

The first step in developing a classification system of elearning platforms is the need for a common language. Hence, as outlined above, we use metaphors or analogies as a ‘springboard’ for the conceptualisation of our model. We depict LMSs to be supermarkets, LAMS as a school and VLE 2.0 as airports. Moreover, Table 1 provides some definitions of the three broad categories that will be contrasted: LMS, LAMS and VLE 2.0. To complicate the issue further, a number of scholars refer to LMSs as course management systems (CMS), learning course management systems (LCMS), virtual learning environments (VLEs) or even equate LAMS with LMS (Cameron & Mahoney, 2008; Daniels, 2009; Yasar & Adiguzel 2010). The confusion of terms is not useful for novice lecturers or students who seek to acquaint themselves with the utility of elearning tools and their functions. There are increasing numbers of commercial and open source LMSs (such as Blackboard, Moodle, WebCT) in use at present. Because there are many LMS systems in use in higher and further education and increasingly in corporate institutions, one of the problems facing stakeholders is to understand their functions, similarities and differences in utility, nature and purpose. To add another layer of complexity, there is, at present, no

commonly agreed upon definition of LMSs, LAMS or VLE 2.0. Nevertheless, we introduce three definitions (see below) that we use as a foundational construct for our model.

Table 3: Systems used by Australian Higher Education and TAFE institutions

Higher Education Institution	LMS platform	Source (commercial/open/local)
Australian Catholic University	BB	Commercial
Australian National University	MOO	Open
Bond University	BB	Commercial
Central Queensland University	BB	Commercial
Charles Darwin University	BB	Commercial
Charles Sturt University	CSU Interact	Local
Curtin University	BB	Commercial
Deakin University	BB (2010) Desire2Learn (2011)	Commercial
Edith Cowan University	BB/LAMS plug in	Commercial/open
Flinders University	BW	Commercial
Griffith University	BB	Commercial
James Cook University	BB	Commercial
La Trobe University	BW / MOO 2	Commercial
Macquarie University	BW / LAMS	Local/open
Monash University	BB	Commercial
Murdoch University	BW	Commercial
Queensland University	BB	Commercial
RMIT	BB	Commercial
Southern Cross	BB	Commercial
Swinburn University	BB	Commercial
University of Adelaide	BB	Commercial
University of Ballarat	BB	Commercial
University of Canberra	MOO	Open
University of Melbourne	BB	Commercial
University of New England	BB / Moo 2	Commercial
University of New South Wales	BB Vista	Commercial
University of Newcastle	BB	Commercial
University of Notre Dame Australia - The	BB	Commercial
University of Queensland	BB	Commercial
University of South Australia	UniSAnet	Local
University of South Queensland	MOO	Open
University of Sydney	BW	Commercial
University of Tasmania	BW	Commercial
University of Technology Sydney	BB	Commercial
University of the Sunshine Coast	BB	Commercial
University of Western Australia	BW	Commercial
University of Western Sydney	BB	Commercial
University of Wollongong	BW	Commercial
Victoria University	BW	Commercial

Adapted from Mark Smithers (2009)

BB=Blackboard (various versions ranging from BB v6 to BB v9)

BW=WebCT/Blackboard

BV=Blackboard Vista

MOO=Moodle (various versions ranging from MOO v1 to v2 [released in 2011])

Has the use of LMS become an integral part of the higher and further learning experience in Australia? A quick survey of the institutional websites confirms that all institutions use a learning management system that is promoted to students. As outlined above, the widespread usage of LMSs brings with it increasing

confusion and complexity. The attractiveness of LMSs is usability and flexibility, generally perceived as a tool for 24/7 access to information.

We have drawn on Smithers (2009) in the compilation of this table. Smithers's aim in constructing an initial overview of LMSs use at Australian universities was to lessen the confusion and provide an overview of systems usage by Australian higher education institutions. We have adapted and updated Smithers's initial table and based on the evidence at hand, it is clear that Australian universities favour commercial LMSs over open source ones. The standard BlackBoard system is seen as the most popular LMS.

We depict LMSs as transactional platforms that are mainly used by lecturers as document depositories and for posting announcements or collecting (and marking) assignments. The 2009 benchmark report of LMS usage at Griffiths University and the University of Western Sydney confirms the view that LMA are primarily used as information repositories. Kevin Ashford-Rowe and Jane Malfroy (2009) state:

Most [LMS] sites contain a wide range of lecture related material such as course/unit outlines, lecture notes, reading material, and web links. ...This approach to usage certainly supports a more traditional pedagogical approach compared to sites that are media rich and foster collaborative learning.....Not only can these affordances improve efficiency in academic management but they also offer more systematic approaches to identifying students at risk. (p. 6)

These findings make explicit the preferred usage of LMS by lecturers as a 'supermarket' for students. This strategy of utilising LMS as a local supermarket with 24/7 access is further exemplified by the following analysis:

It was also very positive to note the high number of course/units sampled that provided a wide range of explicit learner support such as guides, website links, and exam examples. These resources are providing access to all students. (Ashford-Rowe & Malfroy, 2009, p. 6)

In a similar fashion, we use our LMS mainly as a document repository or local supermarket with 24/7 access.

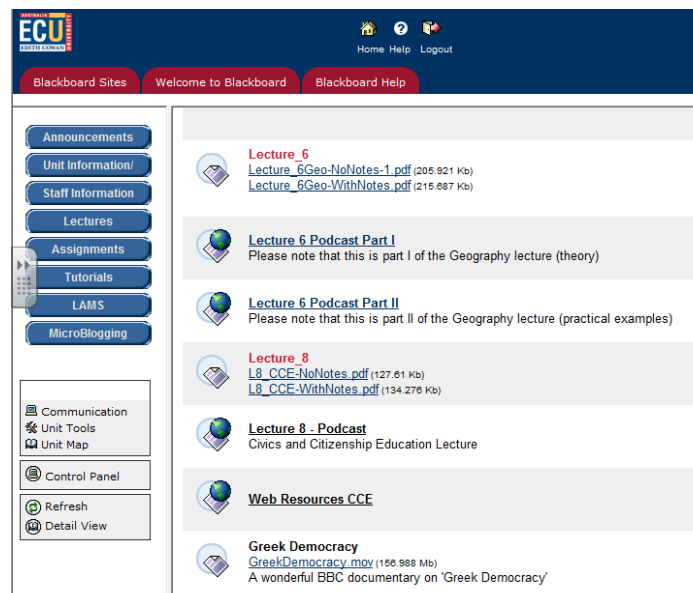


Figure 2: Blackboard used as document/resource depository
What is LAMS and how is it different from LMSs?

We depict LAMS to be a school. LAMS stands for Learning Activity Management System and emphasises 'activity' or interactive engagement between students and material. This platform is depicted as a 'school' because it emphasises learning through communication and interaction. LAMS invites a

Pedagogy 2.0 (McLoughlin & Lee, 2008) attitude and encourages a novel way of resource sharing, supporting deep engagement and co-construction of knowledge in a structured and scaffolded learning environment. This novel way of learning, referred to by Barab, Dodge, Tuzun et al (2007) as ‘communication affordance’, is guided but at the same time also self-paced and student controlled. The primary means of active participation and communication in LAMS is through text-based communication. Learners can communicate synchronously in ‘chat’ sessions or asynchronously in ‘forum’ sessions or use the Q&A (Question and Answer) tool to post individual responses that can be viewed by all learners (either anonymously or not, depending on the program setting determined by the author). All of the various LAMS tools are designed to invite students to be active participants and co-producers of knowledge through dialogue and debate, encouraging metacognition. Metacognition is generally considered to involve higher-order thinking about cognition (often referred to as reflection) providing some control over processes. This style of learning involves a number of tasks that seem to provide support for the development of key (life) skills, such as information seeking, critical thinking and collaboration.

The distinction between LAMS and VLE 2.0 is not clear and they should perhaps not be seen as different species, but rather as parallel environments, evolving consecutively, addressing different needs and preferences, being effectively different part of the same developing elearning city. The first so called VLEs emerged in the mid 90’s such as Virtual-U™ (Harasim, Calvert, and Groeneboer, 1996) and WebCT (now Blackboard™) (Goldberg, 1997) in the days of Web 1.0. Contrary to Web 2.0 applications, which are process focused, the Web 1.0 tools were content focused, based on a traditional classroom model with a number of standard educational tools, working on the lowest common denominator approach with cumbersome interoperability (Webber, 2007). They have been described as ‘monolithic’ but have become increasingly popular and were adopted widely in Higher Education Institutions (HEIs) across the world. (Webber *et al* 2005).

What are VLEs and how are they different from LAMS?

Our analogy for (MU)VLEs or simply VLE 2.0 is that they are conceptualised as airports. Weller (2006) coined the term VLE 2.0. His aim was very much in keeping with the social networking developments of Web 2.0. He notes:

In elearning terms, VLEs, and in particular commercial VLEs have acted as the pioneer species, moving in to the new environment and creating slight changes which make the habitat suitable for secondary colonizers. (Weller, 2007).

A more customisable, interoperable web services based solution now exists using a technology called service-orientated architecture (SOA), focusing on process rather than content. This is a form of electronic superglue that allows standards based educational tools to be seamlessly integrated regardless of the technologies that they were created from (Reynolds, 2010). This new conceptualisation and the variety of tools allows for a range of pedagogical models to be created that are globally connectable and universally available in either open or membership formats.

The open source models (such as LAMS, MOODLE, SocialLearn, Open University, UK) are truly decentralised (Weller, 2009) and democratic, allowing access for all. The membership models bring other attributes to the subscribing groups such as the maintenance of quality control, consistent improvement and updates, and intelligence on all activities in the learning ecosystem (UDENTE –Universal Dental Elearning or Universal Dissemination of Elearning with a Networked Technological Environment, <http://www.udente.org>) (Schonwetter *et al.*, 2010). For the membership models an international airport metaphor is suggested:

- each HEI brings in its own plane of students, staff, and crew to the Terminal – the captain being the Dean. (*Charter/scheduled members*)
- the luggage is tagged and is full of a range of objects which can be uploaded into the airport and new luggage chosen by the travellers from the luggage carousel. (*Learning Objects*)
- all the travellers are subject to airport security. (*Login, legal and copyright issues*)

- the concourse is an area for discussion and collaboration and the shops a place to buy extra items for travel. Timetables can be obtained and other tools for travel, to make the onward journey more pleasant and organised. (*The Global Forum*)
- the course options can be seen on the arrival and departure boards and security assured through logins and passports. (*Courses*)
- Radar for the air traffic control will inform the airport who is about to arrive or depart. (*Monitoring, feedback and audit*)



Figure 3: 3D view of the airport metaphor for a membership model advanced VLE

The metaphors can be emulated in 3D environments themselves, using avatars as the user presence. The 3D world software such as OpenWonderland may create the central scenario with tools and content hyperlinked to hotspots, or the VLE 2.0 systems may provide the educational tools and content that are covered by a skin depicting a 3D environment that likewise has interactive areas. Either way MUVES are created. These should not be confused with MUVES (Melbourne University Virtual Environments for Simulation, <http://www.youtube.com/watch?v=dneNzOPOFPQ>). This work is in development and simulated environments using haptics will be the next important development for practical training (Elson *et al* 2009). It is outside the scope of the current paper to discuss this element further. However, we will build on our current conceptualisation to develop this idea further.

Discussion

It may seem at first glance that the discussion presented here is mainly of academic value, but we argue that lecturers, teachers, students and information technology experts from various fields will need to develop a common language to understand the increasing complexity of technology-enhanced learning and teaching in higher and further education and increasingly in school education. Using metaphors to aid common conceptualisation, we have developed a three-dimensional model, outlining three well known community based environments, namely a supermarket, school and airport to help clarify the developmental milestones of elearning environments. As outlined above, this work is only beginning and the models will need further development and testing to assess their validity and impact on novice users.

Furthermore, however difficult it may be to create metaphors for complex elearning and blended face-to-face and online learning environments, these metaphors may aid educational providers with insights to meet the challenges of a growing digital society (Weller 2009).

Conclusion

Online and blended learning has greatly expanded in higher and further education and is set to change the education landscape drastically in the future (Garrison and Vaughan, 2008). With the increase in offerings of non-traditional learning and teaching, the confusion about the similarity and/or difference between learning modes and systems in support of learning and teaching is equally increasing. Learning management systems can be either commercial products (such as Blackboard), open source (such as Moodle) or 'in-house' or locally developed' (such as e3learning's LMS from LearnForce). LAMS has been introduced here as a school, representing a 'second dimension' application (see Table xx), because we intended to draw attention to the shifting focus from information provision/consumption to student knowledge production (Dobozy, forthcoming).

Classification systems and data visualisation techniques such as presented in this paper are expected to provide a practical foundation for lecturers, teachers and students, who are increasingly asked to engage in elearning and eteaching activities, often with minimal formal training or tentative understandings. This situation is fuelling ambivalence towards new learning and teaching models that move away from traditional face-to-face, structured delivery of learning content to more process oriented inquiry-based learning and teaching. There is, therefore, an urgent need for greater clarity and support of users to maximise the benefit of existing learning platforms and spaces.

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Please cite as: Dobozy, E. & Reynolds, P. (2010). From LMS to VLE or from supermarkets to airports: Classifying elearning platforms using metaphors. *Proceedings of the 5th International LAMS Conference 2010*. <http://lamsfoundation.org/lams2010sydney/papers.htm>

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